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Washington, DC 20005-3096

EXAMINER

ARANCIBIA, MAUREEN GRAMAGLIA

ART UNIT	PAPER NUMBER
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1763

MAIL DATE	DELIVERY MODE
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06/28/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/736,783

Applicant(s)

HONJOU ET AL.

Examiner

Maureen G. Arancibia

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 3/27/07.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-12,14-21 and 24-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-12,14-21 and 24-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. **Claims 24-26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

Specifically, the recitation in Claim 24 that “at least one of the plurality of pieces has an end portion that is wider in inside diameter and an end portion of another one of the plurality of pieces...is narrower in outside diameter” is unclear, since it is not clear *than what* the inside diameter is wider, or the outside diameter is narrower. For the purposes of the following examination on the merits, this recitation has been interpreted as meaning that the recited inside diameter is wider than the inside diameter of the liner, and that the recited outside diameter is narrower than the outside diameter of the liner.

the recitations in Claims 25 and 26 that “said one of the plurality of pieces is disposed *nearest* to the sample chamber” or “*nearest* to the plasma chamber” are unclear, since it is not clear *than what* the one of the plurality of pieces is *nearer* to the sample or plasma chamber. For the purposes of the following examination on the merits, these recitations have been broadly interpreted to mean that said one of the plurality of pieces is disposed nearest to the sample chamber *relative to the another piece disposed farther from the sample chamber* or nearest to the plasma chamber *relative to the another piece disposed farther from the plasma chamber*, respectively.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 1, 2, 6-8, 24, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) in view of U.S. Patent 6,613,587 to Carpenter et al.**

In regards to Claim 1, AAPA teaches a plasma processing apparatus (Figure 1), comprising: a plasma chamber 607 in which a high-density plasma is generated; a sample chamber 601 in communication with the plasma chamber for housing a sample 603 to be processed using the plasma; and a protection tube 620 for protecting an inner wall of the plasma chamber from deposition of a product that results from the plasma processing.

AAPA does not expressly teach that the protection tube is composed of a plurality of pieces.

Carpenter et al. teaches that a protection tube 30 is composed of a plurality of pieces 31-38 that can differ in length, wherein at least some of the pieces can be sized for passing through a passageway into and out of the chamber. (Column 4, Lines 5-22) Note that Carpenter et al. teaches that at least some of the pieces forming the middle part of the liner can be shorter in axial length than the top piece 31 and bottom piece 38. (Figure 2)

It would have been obvious to one of ordinary skill in the art to modify the protection tube taught by AAPA for it to be composed as taught by Carpenter et al. The motivation for making such a modification, as taught by Carpenter et al. (Column 1, Lines 45-57; Column 4, Lines 5-22), would have been to allow damaged sections of the protection tube to be replaced without having to replace the entire protection tube and without having to disassemble the plasma chamber. One of ordinary skill in the art would have been further motivated to vary the lengths of the plurality of pieces in the manner taught by Carpenter et al. in order to differentiate them from each other, and to make sure that the damaged sections are replaced with the matching replacements.

The combination of AAPA and Carpenter et al. teaches the structural limitations of a protection tube comprising a plurality of pieces disposed in an axial direction, wherein at least one of the plurality of pieces is shorter in axial length than at least one other piece disposed farther from the sample chamber (i.e. at least one of the center pieces is shorter than a bottom piece of the liner, which is disposed farther from the sample chamber). This structure meets all of the *structural limitations* of the claim. In regards to Claim 25, this piece is disposed nearest to the sample chamber *relative to the another piece disposed farther from the sample chamber*, as broadly recited in the claim.

In regards to Claim 2, AAPA teaches that the plasma chamber 607 and the protection tube 620 are tubular in shape (Figure 1). The combination of AAPA and Carpenter et al. teaches that the plurality of pieces are tubular members disposed in an axial direction of the protection tube to comprise the protection tube.

In regards to Claim 6, AAPA teaches that the protection tube is made of quartz.
(Specification, Page 4, Line 1)

In regards to Claims 7 and 8, AAPA teaches that the apparatus is an electron cyclotron resonance plasma apparatus that subjects the sample to sputtering.
(Specification, Page 2, Line 2)

In regards to Claim 24, the combination of AAPA and Carpenter et al. does not expressly teach how the plurality of pieces of the protection tube are coupled to each other.

Carpenter et al. additionally teaches that the plurality of pieces of protection tube 30 can coupled with tongue and groove interconnections (Figure 2; Column 4, Lines 34-36), wherein at least one of the plurality of pieces has an end portion (the inside face of the tongue) that is wider in inside diameter than the inside diameter of the liner, and an end portion of another one of the plurality of pieces that is coupled to the wider inside (the outside face of the groove) is narrower in outside diameter than the outside diameter of the liner, as broadly recited in the claim.

It would have been obvious to one of ordinary skill in the art to modify the combination of AAPA and Carpenter et al. to have the pieces of the protection tube be coupled to each other via tongue and groove interconnections, as taught by Carpenter et al. The motivation for doing so, as would have been apparent to one of ordinary skill in the art at the time of the invention, would have been to allow for easy alignment, assembly, and disassembly of the liner pieces.

The tongue and groove interconnections taught by the combination of AAPA and Carpenter et al. would so couple each of the plurality of pieces to another piece so as not to prevent the expansion of the other piece, *as broadly recited in the claim*. The tongue and groove interconnection would still allow at least a small amount of thermal expansion of each piece in some direction at some point along the length of the piece.

5. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of Carpenter et al. as applied to claim 1 above, and further in view of U.S. Patent 6,797,639 to Carducci et al.

The teachings of AAPA and Carpenter et al. were discussed above.

In regards to Claims 4 and 5, the combination of AAPA and Carpenter et al. does not expressly teach that the protection tube is provided with a plurality of grooves on the inner wall thereof in parallel with an axis of the protection tube at substantially equal circumferential intervals (i.e. evenly spaced longitudinal grooves).

Carducci et al. teaches that a protection tube 118 can be provided with evenly spaced longitudinal grooves 1810. (Figure 20; Column 18, Lines 1-2)

It would have been obvious to one of ordinary skill in the art to modify the combination of AAPA and Carpenter et al. to provide the protection tube with a plurality of evenly spaced longitudinal grooves on the inner wall thereof. The motivation for making such a modification, as taught by Carducci et al. (Column 16, Line 33 - Column 17, Line 39), would have been to increase adhesion of deposited films on the protection tube and thereby reducing flaking of such films into the chamber and subsequent substrate contamination or damage.

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6. Claims 9-12, 16-21, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of Carpenter et al. as applied to claims 1-3, 6-8, and 25 above, and further in view of U.S. Patent 6,408,786 to Kennedy et al.

The teachings of AAPA and Carpenter et al. were discussed above in regards to Claims 1 and 25.

In regards to Claims 9 and 10, the combination of AAPA and Carpenter et al. does not expressly teach that the plasma is an inductively coupled plasma or a helicon wave plasma.

Kennedy et al. teaches that ECR, inductive coupling, and helicon wave are equivalent means of generating plasma.

It would have been obvious to one of ordinary skill in the art to select any of ECR, inductive coupling, or helicon wave as art-recognized equivalent means to generate a plasma. It has been held that an express suggestion to substitute one equivalent component or process for another is not necessary to render such substitution obvious. *In re Fout*, 675 F.2d 297, 213 USPQ 532 (CCPA 1982).

In regards to Claim 11, AAPA does not expressly teach that a protection tube can be disposed in the sample chamber.

Kennedy et al. teaches that a tubular protection tube 20 can be disposed in a sample chamber 2.

It would have been obvious to one of ordinary skill in the art to modify the apparatus taught by AAPA to dispose a protection tube in the sample chamber. The

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motivation for doing so, as taught by Kennedy et al. (Column 1, Lines 56-58), would have been to protect the walls of the *sample* chamber.

The combination of AAPA and Kennedy et al. does not expressly teach that the protection tube is composed of a plurality of pieces.

Carpenter et al. teaches that a protection tube 30 is composed of a plurality of pieces 31-38 that can differ in length, wherein at least some of the pieces can be sized for passing through a passageway into and out of the chamber. (Column 4, Lines 5-22) Note that Carpenter et al. teaches that at least some of the pieces forming the middle part of the liner can be shorter in axial length than the top piece 31 and bottom piece 38. (Figure 2)

It would have been obvious to one of ordinary skill in the art to modify the protection tube taught by the combination of AAPA and Kennedy et al. for it to be composed as taught by Carpenter et al. The motivation for making such a modification, as taught by Carpenter et al. (Column 1, Lines 45-57; Column 4, Lines 5-22), would have been to allow damaged sections of the protection tube to be replaced without having to replace the entire protection tube and without having to disassemble the plasma chamber. One of ordinary skill in the art would have been further motivated to vary the lengths of the plurality of pieces in the manner taught by Carpenter et al. in order to differentiate them from each other, and to make sure that the damaged sections are replaced with the matching replacements.

In this case, the combination of AAPA, Kennedy et al., and Carpenter et al. teaches the structural limitations of a protection tube in the sample chamber comprising

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a plurality of pieces disposed in an axial direction, wherein at least one of the plurality of pieces is shorter in axial length than at least one other piece disposed farther from the plasma chamber (i.e. at least one of the center pieces is shorter than a top piece of the liner, which is disposed farther from the plasma chamber). This structure meets all of the *structural limitations* of the claim. In regards to Claim 26, this piece is disposed nearest to the plasma chamber *relative to the another piece disposed farther from the plasma chamber*, as broadly recited in the claim.

In regards to Claim 12, AAPA teaches that the sample chamber 601 is tubular. (Figure 1) The combination of AAPA, Kennedy et al., and Carpenter et al. teaches that the plurality of pieces are tubular members disposed in an axial direction of the protection tube to comprise the protection tube.

In regards to Claim 16, the combination of AAPA, Kennedy et al., and Carpenter et al. just discussed does not expressly teach that the protection tube in the sample chamber is made of quartz.

AAPA teaches that a protection tube can be made of quartz. (Specification, Page 4, Line 1)

It would have been obvious to one of ordinary skill in the art to form the protection tube in the sample chamber out of quartz, as well. The motivation for doing so would have been to select an art-recognized (AAPA) suitable material for manufacturing the protection tube.

In regards to Claims 17 and 18, the apparatus taught by combination of AAPA, Carpenter et al., and Kennedy et al. would be inherently capable of subjecting the

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sample to etching or chemical vapor deposition, based on the process conditions. This rejection is based on the fact the apparatus structure taught above has the inherent structural capability of being used in the manner intended by the Applicant. When a rejection is based on inherency, a rejection under 35 U.S.C. 102 or U.S.C. 103 is appropriate. (See *In re Fitzgerald* 205 USPQ 594 or MPEP 2112).

In regards to Claim 19, see the discussion of Claim 8 above.

In regards to Claims 20 and 21, see the discussion of Claims 9 and 10 above.

7. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of Carpenter et al., and further in view of Kennedy et al. as applied to claim 11 above, and further in view of Carducci et al.

The teachings of AAPA, Carpenter et al., and Kennedy et al. were discussed above.

In regards to Claims 14 and 15, the combination of AAPA, Carpenter et al., and Kennedy et al. does not expressly teach that the protection tube is provided with a plurality of grooves on the inner wall thereof in parallel with an axis of the protection tube at substantially equal circumferential intervals (i.e. evenly spaced longitudinal grooves).

Carducci et al. teaches that a protection tube 118 can be provided with evenly spaced longitudinal grooves 1810. (Figure 20; Column 18, Lines 1-2)

It would have been obvious to one of ordinary skill in the art to modify the combination of AAPA, Carpenter et al., and Kennedy et al. to provide the protection tube with a plurality of evenly spaced longitudinal grooves on the inner wall thereof.

The motivation for making such a modification, as taught by Carducci et al. (Column 16, Line 33 - Column 17, Line 39), would have been to increase adhesion of deposited films on the protection tube and thereby reducing flaking of such films into the chamber and subsequent substrate contamination or damage.

Response to Arguments

8. Applicant's arguments filed 27 March 2007 have been fully considered but they are not persuasive.

In response to Applicant's arguments against the references individually, specifically, that Carpenter et al. alone does not teach the positional relationship between the plurality of pieces and the sample chamber, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Specifically, in response to Applicant's argument that there is no motivation to combine the teachings of AAPA and Carpenter et al. because Carpenter et al. does not teach protecting an inner wall of a plasma chamber against temperature gradients or preventing breakage of the protection tube, the fact that Applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

In regards to Applicant's remaining arguments in regards to the teachings of the cited prior art in relation to the amendments to the claims, Examiner's position in regards to the teachings of the cited prior art is clearly set forth in the rejection above.

Conclusion

9. Applicant's amendment necessitated any new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

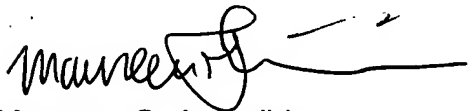
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maureen G. Arancibia whose telephone number is (571) 272-1219. The examiner can normally be reached on core hours of 10-5, Monday-Friday.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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